

Patterns on the Hundred Chart

Reporting Category Pattern, Function, and Algebra

Topic Exploring patterns

Materials

- A large hundred chart for display
- Hundred Chart (attached)
- Counters in at least two colors
- 0–99 Chart (attached)
- Broken Hundred Chart Puzzle Cards (attached)
- Blank hundred chart
- Crayons or markers
- Pattern Game Directions (attached)
- Pencils and paper clips for the spinners
- Pattern Game Board (attached)
- Pattern Game Cards (attached)

Vocabulary

pattern, table, rule, growing, repeating, extending, numeric pattern, geometric pattern

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Give each student a copy of the hundred chart and a handful of counters. Create and display several patterns, and ask students to duplicate the patterns on their charts, using counters. Ask them to look for patterns on the chart (A pattern in the third row, where 2 is always in the tens place and the ones place digits increase from 1 to 9).
2. Direct students to place counters on the chart on all multiples of 2 (skip count by twos) and to describe the resulting pattern. Ask whether this is a repeating or growing pattern.
3. Put students into pairs or small groups, and have groups explore other patterns on the chart formed by multiples of other numbers. Give each group a number, and have them cover that number and its multiples with counters. If two groups have the same number, have the two groups compare their patterns and discuss any similarities or differences they find. If there are differences, have them explain why.
4. Ask students to place counters on all numbers that have a 3 in the ones place or a 3 in the tens place and explain the resulting pattern. Ask how many numbers have a counter on them. Next, have students place counters on all numbers that contain the digit 7 and describe the resulting pattern. Ask how many numbers have a counter on them. Have students try this with other digits to see whether they get the same result. Ask them to explain why or why not.

5. Ask students to cover the multiples of 2 with counters of one color and then cover the multiples of 3 with counters of a different color. Have students identify the numbers that have two counters on them and explain why there are two counters on those numbers.
6. Ask students to cover 8, 17, 26, 35, 44, 53, 62, and 71 with counters and describe the resulting pattern. (Each number is one row down and one column to the left.) Ask students whether there is a rule for this pattern, and guide them to see that the numerical pattern or rule is “nine more than” or “counting on by nines.” Ask students whether they could describe the rule in another way (adding 10 and then subtracting 1).
7. Ask students to cover 3, 14, 25, 36, 47, 58, and 69 with counters and describe the resulting pattern. (Each number is one row down and one column to the right.) Ask students to describe the numerical pattern or rule for this pattern. (“Eleven more than” or “counting on by elevens”) Ask students whether there is another way to describe this pattern. (Adding 10 and then adding 1.)

Assessment

- **Questions**
 - On a hundred chart, which skip count or rule makes the column pattern?
 - What is the rule for the pattern 7, 13, 19, 25...? What would be the next three numbers in the pattern?
- **Journal/Writing Prompts**
 - Explain which skip count or rule makes the diagonal pattern on a hundred chart.
 - For any number between 1 and 100, explain how you can determine whether your pattern will include that number.

Extensions and Connections (for all students)

- Inform students that different patterns emerge with a different configuration of the chart. Distribute copies of the 0–99 chart, and have students try some of the same patterns on it. Additional patterns to explore include the following:
 - Cover all numbers with two identical digits.
 - Cover all numbers with digits that add up to 8.
 - Cover all numbers with a first digit that is larger than the second digit.
 - Cover all numbers containing the digit 4.
 - Cover all numbers with digits that add up to 10.
- Distribute copies of the cards provided on the Broken Hundred Chart Puzzle Cards sheet, and have students work in pairs or small groups to determine the missing numbers puzzle on each card. The cards contain “broken” portions of a hundred chart. (Note: Some students may need a hundred chart in order to complete the missing numbers.) Students need to justify their reasoning on how they solved each puzzle.
- Distribute copies of a blank hundred chart and crayons or markers. Ask each student to write his/her first name in the chart, putting the first letter in the first square, writing one letter per square, and leaving no spaces. Then, have students repeat this process, continuing to fill in all 100 squares with the letters of their first name, over and over. Next, instruct each student to color all the squares containing the first letter of his/her name. Ask each student to describe the pattern the first letters of his/her name makes on the chart.

- Have students work in groups of two to four to play the “Pattern Game,” using the attached Pattern Game Directions, a pencil and paper clip for the spinner, the Pattern Game Board, and the Pattern Game Cards.

Strategies for Differentiation

- **Technology**
 - Provide students with an enlarged hundred chart.
 - Have students start with an enlarged chart of 0–50 to practice patterns.
- **Multisensory**
 - Have students use cotton balls to mark their patterns on the hundred charts.
 - Display a list of numbers that have been called for ongoing reference.
- **Community Connections**
 - Arrange for students to visit a candy factory where candy is packaged in groups of three and four or to a donut factory where donuts are packaged in groups of 12. There, students could observe workers packing food items in boxes in specific patterns and learn that if the pattern is incorrect, the items cannot be packaged.
- **Small-Group Learning**
 - Have groups of four students look for new patterns in hundred charts.
- **Vocabulary**
 - Students need to know the following vocabulary: *hundred*, *pattern*, *even*, and *odd*. Add these words to the classroom’s math word wall.
 - Determine word patterns, and have students find words that fit the patterns.
 - Create pattern examples on display charts, or, if appropriate, have students do it.
- **Student Organization of Content**
 - Provide each student with a personal hundred chart marked with color-coded patterns to keep in their notebooks (e.g., 2, 4, 6, 8... in red, 1, 3, 5, 7... in blue).

Hundred Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

0–99 Chart

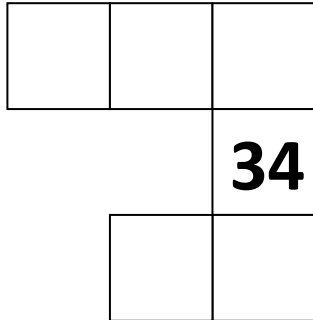
0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

Broken Hundred Chart Puzzle Cards

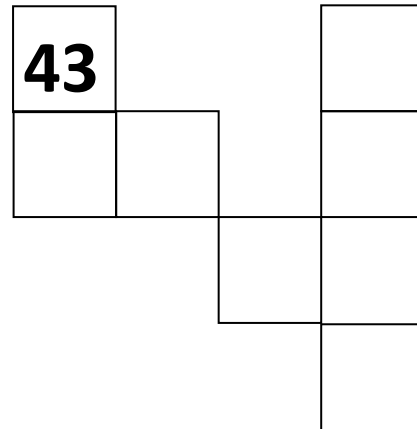
Copy cards onto cardstock, and place sets in baggies to use for group work.

This sheet could be used as the recording sheet.

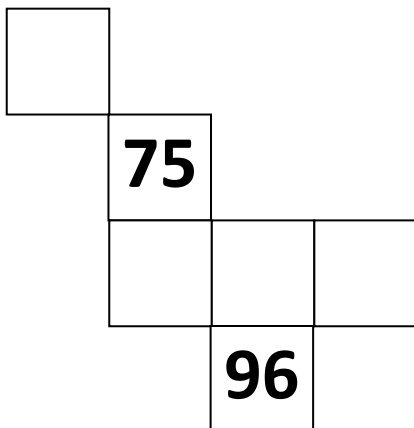
Card A



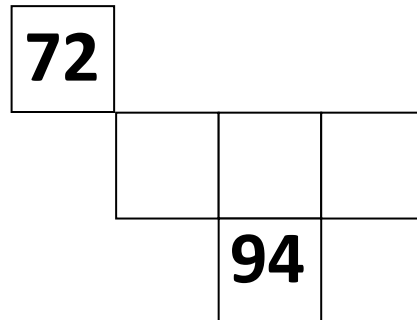
Card B



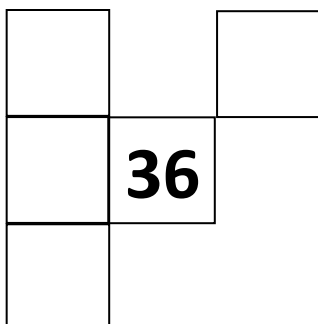
Card C



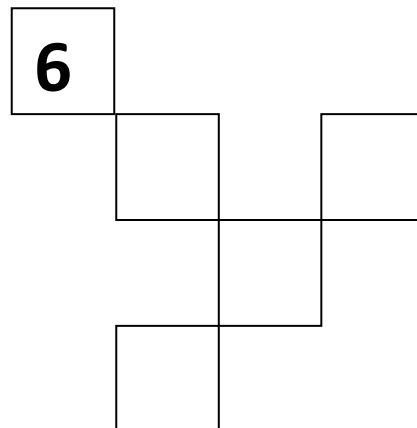
Card D



Card E



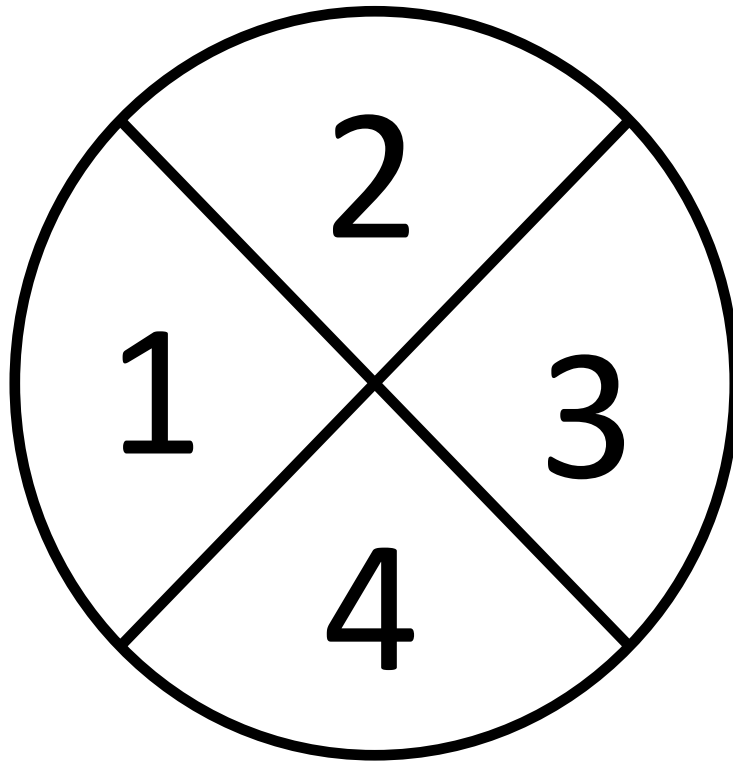
Card F



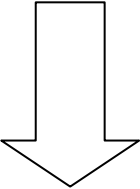
Pattern Game Directions

Directions for 2–4 players:

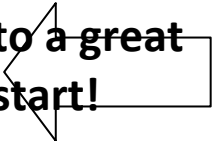
1. Place the Pattern Game Cards face down in a stack on the table. Each player places his/her game piece at the start line.
2. Each player spins the spinner one time to determine who goes first.
3. The first player draws a card and answers the question. If the answer is correct, the player spins the spinner and moves ahead that many spaces. If the answer is incorrect, the player stays put.
4. Play continues clockwise around the group until one player reaches FINISH.

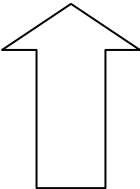


START




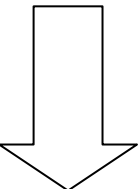
You're off to a great start!






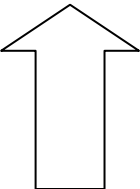
Miss 1 turn.



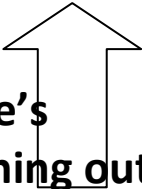


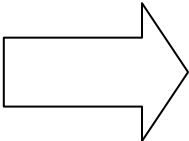
Go ahead 1 space.

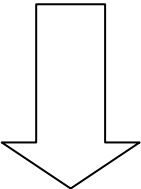




Time's running out. Miss 1 turn.

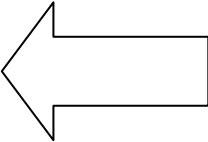


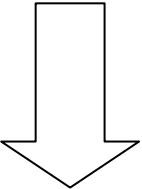


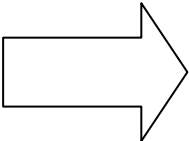


FINISH

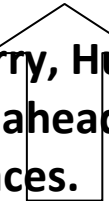
Pattern Game Board

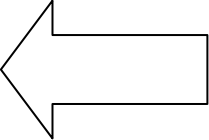







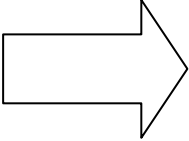
Hurry, Hurry! Go ahead 2 spaces.

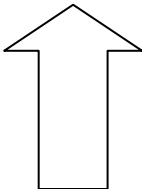


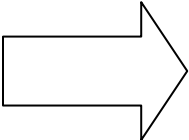


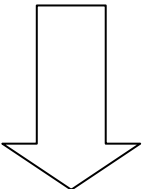
Miss 1 turn.



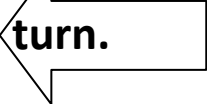








Loose 1 turn.



Pattern Game Cards

<p>What is the rule for this pattern?</p> <p>13, 16, 19, 22, 25...</p>	<p>What is the rule for this pattern?</p> <p>42, 40, 38, 36...</p>	<p>What is the rule for this pattern?</p> <p>35, 40, 45, 50...</p>
<p>What is the rule for this pattern?</p> <p>15, 17, 19, 21...</p>	<p>What is the rule for this pattern?</p> <p>19, 16, 13, 10...</p>	<p>What is the rule for this pattern?</p> <p>1, 2, 4, 7, 11, 16...</p>
<p>What is the rule for this pattern?</p> <p>2, 4, 8, 16, 32...</p>	<p>What is the rule for this pattern?</p> <p>1, 5, 25, 125, 625...</p>	<p>What is the rule for this pattern?</p> <p>50, 100, 150, 200...</p>
<p>What is the next number in this pattern?</p> <p>18, 24, 30, 36, ____</p>	<p>What is the next number in this pattern?</p> <p>21, 28, 35, 42, ____</p>	<p>What is the next number in this pattern?</p> <p>64, 56, 48, 40, ____</p>
<p>What is the next number in this pattern?</p> <p>126, 128, 130, 132, ____</p>	<p>What is the next number in this pattern?</p> <p>36, 45, 54, 63, ____</p>	<p>What is the missing number in this pattern?</p> <p>37, 49, 61, ____, 85</p>

Finish the pattern
according to the rule:
Add 8.

13, __, __, __

Finish the pattern
according to the rule:
Subtract 3.

86, __, __, __

Finish the pattern
according to the rule:
Multiply by 2.

1, __, __, __

Finish the pattern
according to the rule:
Add 16.

21, __, __, __

Finish the pattern
according to the rule:
Multiply by 3.

1, __, __, __

Finish the pattern
according to the rule:
Add 75.

20, __, __, __

Finish the pattern
according to the rule:
Subtract 15.

90, __, __, __

Finish the pattern
according to the rule:
Subtract 9.

100, __, __, __

Finish the pattern
according to the rule:
Add 31.

77, __, __, __

What are the missing
numbers in this pattern?

6, 9, __, 15, 18, __, 24, 27

What are the missing
numbers in this pattern?

1, 2, 4, __, 11, __, 22, 29

What are the missing
numbers in this pattern?

3, 6, __, 24, __, 96, 192

What are the missing
numbers in this pattern?

12, 16, __, 24, 28, __, 36

What are the missing
numbers in this pattern?

27, 36, __, 54, 63, __, 81

What are the missing
numbers in this pattern?

36, 32, __, 24, 20, __, 12